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# High Plains Herald

The National Weather Service provides weather forecasts and warnings for the protection of life and property and the enhancement of the national economy.

The Weather Forecast Office in Cheyenne, WY will be hosting an Open House on September 14. The event will run from 3:00 PM to 7:00 PM. All are invited to tour the office and see the latest weather equipment used to forecast weather and issue warnings. The open house is free and no reservations are required. For more information call our office at 307-772-2468 or email us at [cys.info@noaa.gov](mailto:cys.info@noaa.gov).

## NWS Cheyenne is now on Facebook

By Rebecca Mazur

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NWS Cheyenne entered the world of social media by rolling out with a Facebook page in early May. Using Facebook, information can be readily shared with customers in a more interactive way, such as forecast graphics, hazardous weather outlooks and briefings, interesting weather information, and various reports and pictures of weather

events. The idea is that customers will respond more readily with feedback on the spot, and share their stories of what's happening out in their communities.

Please "like" our page, at <http://www.facebook.com/US.NationalWeatherService.Cheyenne.gov> (or just search Facebook for National Weather

Service, Cheyenne, WY) and share your thoughts and pictures with us.

The weather information on the Facebook page may not always be current, so it is still advised to check the main webpage at [www.weather.gov/cys](http://www.weather.gov/cys) for the most current details.



NWS Cheyenne Facebook Home Page



NWS Cheyenne Facebook Photos and Videos Page

## Women in Science

By Debbie Winston



National Weather Service employees from three area offices, Cheyenne, WY, Riverton, WY, and Boulder, CO participated in the 2011 Women In Science Program at the University of Wyoming in Laramie on May 10th.

Women in Science is an annual event sponsored by the Wyoming NASA Space Grant Consortium. The event provides middle and high school students the opportunity to explore careers in science, technology, engineering and mathematics fields by participating in hands on sessions which give the students a chance to experience some of the science related to their careers of interest.

Rebecca Mazur of the National Weather Service and Victoria Sankovich from the

Bureau of Reclamation led sessions on Meteorology and preformed experiments to demonstrate how the atmosphere works. Have you ever wondered why the sky is blue or why it turns orange at sunset, well these students could tell you after the demonstration. The students also went outside to learn about making weather observations and what it takes to become a meteorologist.

In addition, the NWS manned a booth in the lobby for students to experience the Van De Graff generator and learn about lightning, to see the tornado generator, and to ask questions.

Kim Insana, Meteorologist for Channel 5, was this years keynote speaker and over 400 students from around the state attended.

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## Hail in Southeast Wyoming and Western

By Mike Weiland



Sidney, NE hail 6/13/2011



Hail is common in the summer over many locations in southeast Wyoming and western Nebraska. Hail is most frequent in the afternoon and evening hours as well as in the months of May and June. Much of the hail is small, but hail as large as softballs occurs every summer in our region. The southeast corner of Wyoming and nearby parts of northeast Colorado have the highest frequency of hail of anywhere in the world.

Hail is a form of precipitation that occurs when updrafts in

thunderstorms carry raindrops upward into extremely cold areas of the atmosphere where they freeze into ice. The now frozen raindrop then falls and rises, sometimes numerous times, before it becomes heavy enough that the updraft cannot support it any longer, and it falls to the ground. The higher elevations in our area usually ensure a lower freezing level and a better chance for the hail to form and make it to the ground.

Join Us at the NWS Open House  
September 14th 2PM - 7PM

# Climate Outlook for July–September 2011

By Rich Emanuel

## July–September Climatology:

July is on average the warmest month of the year. August tends to be a little cooler with more significant cooling in September. Average low temperatures across the region east of the Wyoming mountains are in the mid 50's to around 60 degrees in July and August, then fall into the mid 40's for September. Average high temperatures over lower elevations tend to be in the mid 80's to lower 90's in July and August, and in the mid to upper 70's in September. For locations like Laramie and Rawlins, average lows tend to be in the mid 40's to lower 50's in July and August, lowering into the upper 30's to lower 40's in September. Average highs are in the upper 70's to lower 80's for July and August, then cool to around 70 degrees in September.

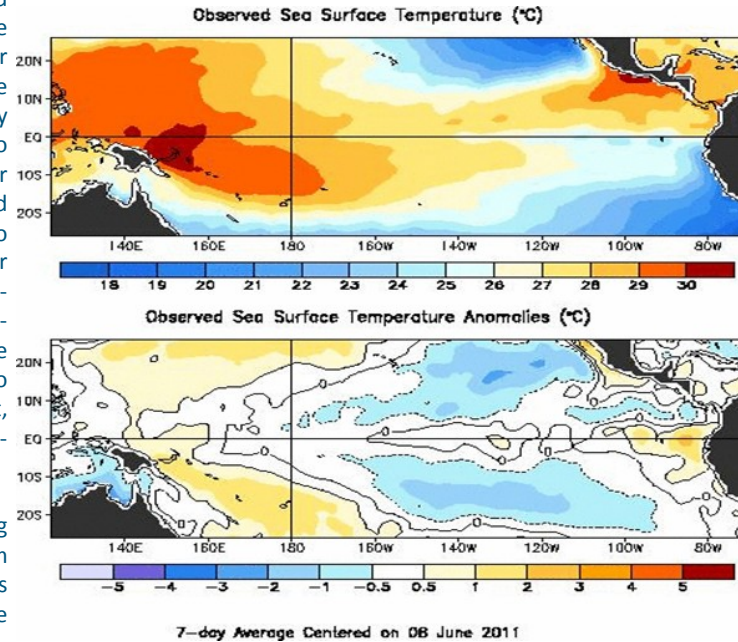
Rainfall begins declining during this period, especially from about mid-August onward, as drier air masses become more common over the region. There is a bit of an upswing in rainfall during the latter part of July into early August as some monsoonal moisture normally invades the region.

Average rainfall east of the mountains ranges from about 2.0 to 2.25 inches in July, and then drops off to about 1.2 to 1.6 inches during September. Laramie and Rawlins average about 1.0 to 1.4 inches of rainfall in each of the three months.

## Current situation:

The event known as La Nina has ended and neutral conditions are being observed over most of the tropical Pacific Ocean as depicted in Figure 1 below: Little change is expected during the remainder of the summer.

Continued on Page 8



More information can be found at the Climate Prediction Center's web-site:

[http://www.cpc.ncep.noaa.gov/products/analysis\\_monitoring/ens0\\_advisory/ensodisc.html](http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/ens0_advisory/ensodisc.html)

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## Just For Fun

## Test your Knowledge of Tornadoes

Tornadoes have occurred in all 50 states.

True / False

Two percent of tornadoes cause 70% of tornado related deaths.

True / False

Open windows to prevent damage caused by the pressure change in storms with tornadoes.

True / False

If driving when a tornado occurs, get under a overpass.

True / False

Storms with tornadoes produce more lightning and hail than storms without tornadoes.

True / False

Answer key is on the last page.



## Weather in History:

## First Operational Tornado Forecast

By Debbie Winston

In March of 1948, just five days after a tornado struck Tinker Air Force Base in Oklahoma, Air Force Captain Robert Miller and Major E. J. Fawbush, made history with the first tornado forecast. After the investigation into the March 20th tornado, the Air Weather Service at Tinker AFB was directed to investigate the possibility of forecasting storms which might produce tornadoes.

In the next three days, they analyzed surface and upper-air weather charts from their recent tornado and many others. They took the findings and those of studies done by the United States Weather Bureau (now the National Weather Service) and came up with a list of weather parameters likely to produce tornadoes, when all were present at the same time.

On the morning of March 25<sup>th</sup>, while reviewing the morning weather charts, they noticed a startling similarity between these charts and the ones from the previous tornado. They continued analyzing the data and reached the conclusion that central Oklahoma would be in a primary tornado threat area that afternoon and early evening.

When the results were initially discussed with the General, it was decided to issue a forecast for heavy thunderstorms, which would serve to alert the base and initiate a new warning system. Throughout the day, incoming reports continued to support the previous evidence. Nearby stations were reporting clouds building and by 1:52 the first thunderstorms were seen on the radar. The General heard the reports and returned to the weather station. After reviewing the information with the General, a decision was made to issue the first operational tornado forecast.

Captain Miller's journal indicates that they were worried they had made a career ending decision; even wondering how he would manage as a civilian. Then shortly after 6:00 PM, at his home, he heard an Urgent News Bulletin that mentioned a destructive tornado and Tinker Air Force Base. He jumped into his car and headed back to the base, which he describes as being in "shambles". Finding the Major and a Sergeant that he worked with at the Weather Station he was given the following description:

*"As the line approached the southwest corner of the field, two thunderstorms seemed to*

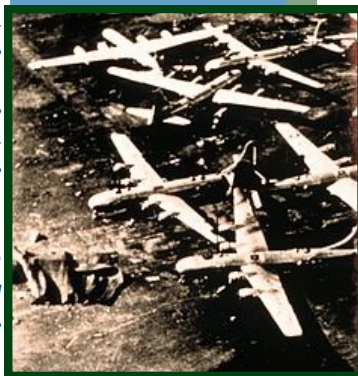
*join and quickly took on a greenish black hue. They could observe a slow counterclockwise cloud rotation around the point at which the storms merged. Suddenly a large cone shaped cloud bulged down rotating counterclockwise at great speed. At the same time they saw a wing from one of the moth-balled World War II B-29's float lazily upward toward the visible part of the funnel. A second or two later the wing disintegrated, the funnel shot to the ground and the second large tornado in five days began its devastating journey across the base very close to the track of its predecessor."*

*"It was all over in 3 or 4 minutes. It seemed much longer. The swirling funnel left \$6 million dollars in damage, \$4 million less than the first storm and significantly, there were no personal injuries. General Borum's Tornado Disaster Plan had been just as successful as the first operational tornado forecast. We became instant heroes, and in my case, the rest of my life would be intimately associated with tornadoes and severe thunderstorms."*

*"The complexity and evolution of the pattern that instigated the sequence of events I have described boggles the mind."*

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Damage from the March 25th tornado.

Damage to Aircraft from the first tornado.



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## Above Normal Atlantic Hurricane Season

By Mike Jamski

The Atlantic basin, including the Caribbean Sea and Gulf of Mexico, is expected to see an above-normal hurricane season this year, according to NOAA's Climate Prediction Center. The hurricane season, which begins June 1 and concludes November 30, is expecting the following ranges:

- 3 to 6 major hurricanes (Category 3, 4 or 5; winds of 111 mph or higher)

Each of these ranges has 70 percent likelihood of occurrence, and indicates that activity will exceed the seasonal average of 11 named storms, six hurricanes and two major hurricanes. The U.S. mainland was fortunate last year as winds steered most of the tropical storms and hurricanes away from the coastlines. This year may have a different outcome, and early preparation is paramount for residents along the Gulf and Atlantic coasts.

Climate factors considered for this outlook include:

- Since 1995, the tropical multi-decadal signal has brought ocean and atmospheric conditions conducive for tropical storm development in sync, leading to more active Atlantic hurricane seasons
- Sea surface temperatures where storms develop and

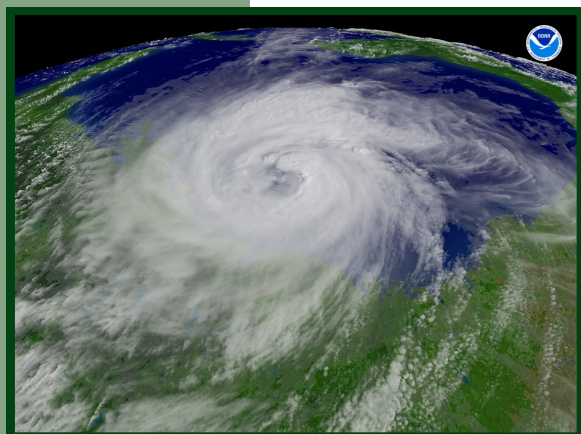
are two degrees Fahrenheit warmer than average.

- La Nina dissipated in late May; however its impacts such as reduced wind shear are expected to continue this hurricane season.

NOAA's seasonal outlook does not predict where and when any of these storms may hit. Landfall is influenced by large-scale weather patterns in place at the time the storm approaches. NOAA's National Hurricane Center predicts how these weather patterns affect the storm track, intensity and rainfall potential. Hurricane impacts are not limited to the coastline; strong winds, flooding and even tornadoes pose a threat to inland areas.

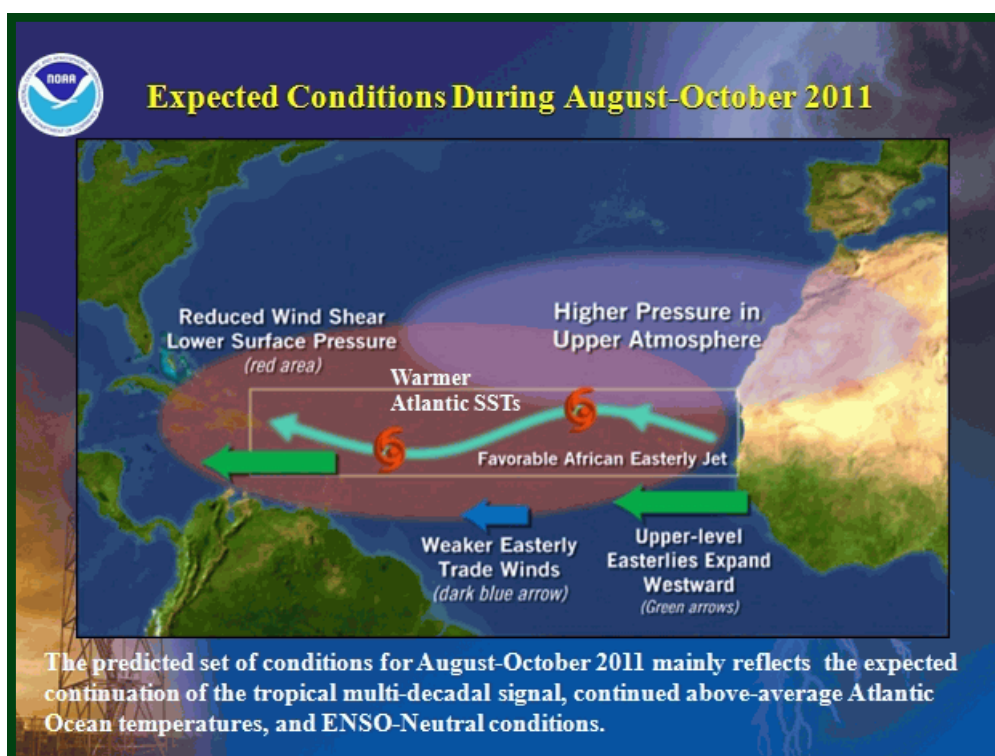
### 2011 Atlantic Storm Names:

Arlene, Bret, Cindy, Don, Emily, Franklin, Gert, Harvey, Irene, Jose, Katia, Lee, Maria, Nate, Ophelia, Philippe, Rina, Sean, Tammy, Vince, Whitney



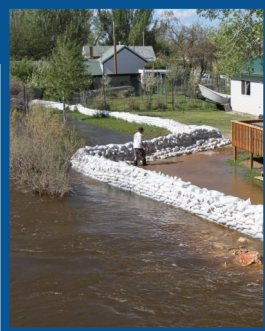
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## Flood Safety Tips

By Mike Weiland



Flooding near Saratoga, Wyoming—June 2011

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If flooding is occurring in your area or will be possible there are a few things to consider to be safe. First of all remember to heed all Watches and Warnings. A Flood or Flash Flood Watch means that there is a potential for flooding in the specified area. Meanwhile, a Flash Flood or Flood Warning means that a flood is imminent or is occurring.

Most flooding in our area occurs from May through September. Snowmelt in the mountains often causing flooding of rivers or streams in the area usually in May and June. Flash flooding from thunderstorms produces heavy rain and possible flooding occurs in May through September. Most of the flash flooding occurs in the afternoon and evening hours in our area.

A flash flood is usually caused by heavy rainfall in a short time from a nearby thunderstorm. Water in streams, even dry ones, can rise quickly and be out of its banks in a short time. This is especially the case in or near steep terrain. In those areas, a wall of water can come rushing down a canyon from heavy rain, as was the case in the Big Thompson Flood in 1976. Also, many of us remember the flood in Chey-

enne on August 1, 1985 when over 5 inches of rain fell in a short time and claimed 12 lives. Flooding causes a yearly average of \$5 billion dollars in damage nationwide and kills more people every year than other types of weather.

There are some things to consider before a flood occurs.

### BEFORE A FLOOD

- Find out if you live in a flood-prone area from your local emergency management agency and by finding out the flood history of your area..

- Find out whether your property is above or below flood level.

- Be aware of your community's warning system for flooding.

- Study flood preparation literature and start putting the information into practice.

- If you live in an area that is frequently prone to flooding, stockpile emergency building materials, including plywood, plastic sheeting, lumber nails, hammer and saw, pry bar, shovels, and sandbags.

- Have check valves installed in building sewer traps to prevent flood waters from backing up in sewer drains.

- As a last resort, use large corks or stoppers to plug showers, tubs, or basins.

- Have an evacuation plan and route. Be sure to practice the evacuation procedures before a true emergency occurs. Find out what the community's evacuation plan is from the local emergency management agency. This should contain the safest routes to shelters. Make sure that you have several

routes planned, in case the first and/or second choices are flooded out.

- Have disaster supplies on hand.
- Flashlights and extra batteries
- Portable, battery-operated radio and extra batteries
- First aid kit and manual
- Emergency food and water
- Non-electric can opener
- Essential medicines
- Cash and credit cards
- Sturdy shoes

### During a Flood

Be aware of the forecast and where you are. If the weather forecast is calling for thunderstorms, think about where you may need to go. If you are outdoors, camping, think about moving to high ground.

### If Indoors:

- Turn on battery-operated radio or television to get the latest emergency information.
- Get your preassembled emergency supplies.
- If told to leave, do so immediately.

### If Outdoors:

- Climb to high ground and stay there.
- Avoid walking through any floodwaters. If it is moving swiftly, even water 6 inches deep can sweep you off your feet.

### If In A Car:

- If you come to a flooded area, turn around and go another way.
- If your car stalls, abandon it immediately and climb to higher ground. Many deaths have resulted from attempts to move stalled vehicles.

**Remember, Turn Around, Don't Drown.**



# Areal Summary of the 2011 Spring

By Richard Emanuel

The spring of 2011 (Which meteorologically is the period March through May) for this region turned out to be fairly typical for what is observed during La Nina; the event where water temperatures over the tropical central and eastern Pacific Ocean are cool-

er than average. La Nina was at moderate to strong strength during the winter but weakened during s p r i n g .

The spring was characterized by a warm start and a cold finish. March was much warm-

er than average over most of the area but was balanced out by May which was much cooler than average. All together the spring was slightly cooler than average across much of the area with just the southern Nebraska panhandle having seen a slightly warmer than average spring.

## Temperatures:

The following table summarizes the monthly and overall spring average temperatures and the departures from normal for select sites over the area:

City	March average temp.	Departure from normal	April average temp.	Departure from normal	May average temp.	Departure from normal	Mar-May average temp.	Mar-May departure from normal
Cheyenne	38.0	+3.8	42.0	+0.4	47.1	-4.2	42.4	0
Laramie	34.0	+4.0	37.2	0.0	43.1	-3.9	38.1	0
Rawlins	34.0	+0.2	38.4	-3.2	46.1	-4.8	39.5	-2.6
Chadron	36.8	+0.6	45.6	-0.3	51.7	-5.1	44.7	-1.6
Scottsbluff	39.9	+2.6	46.5	+0.3	53.0	-3.8	46.5	-0.3
Sidney	39.9	+4.6	46.4	+2.5	52.5	-1.8	46.3	+1.8

**P r e c i p i t a t i o n :** The spring started off on the dry side as most areas had somewhat below average precipitation during the month of March. This reversed in April with above average pre-

cipitation seen for most locations, and May saw much above normal precipitation, particularly over the plains thanks to a couple of very moist and slow moving low pressure systems that affected

t h e r e g i o n . The following table tabulates the March through May precipitation amounts and their departures from average:

City	March pcpn and departure	April pcpn and departure	May pcpn and departure	Total pcpn and departure
Cheyenne	0.78 (-0.27)	1.73 (+0.18)	3.12 (+0.64)	5.63 (+0.55)
Laramie	0.53 (-0.26)	1.96 (+0.90)	1.01 (-0.66)	3.50 (-0.02)
Rawlins	0.64 (-0.01)	2.01 (+0.95)	1.10 (-0.39)	3.75 (+0.55)
Chadron	0.55 (-0.36)	1.97 (+0.08)	6.75 (+3.73)	9.27 (+3.45)
Scottsbluff	1.18 (+0.02)	2.85 (+1.06)	5.87 (+3.87)	9.90 (+4.95)
Sidney	0.62 (-0.95)	2.01 (-0.18)	5.12 (+1.73)	7.75 (+0.60)

March and April typically see some of the highest snowfall of the year over the plains. The warmer and drier March basically resulted in this spring having somewhat below average snowfall across the plains. Cheyenne recorded 17.9 inches of snow in the March through May time period

which was 6.2 inches below average. Scottsbluff saw just about their average snowfall with 14.6 inches measured there during the period.

Scottsbluff recorded their 6<sup>th</sup> wettest spring on record while Chadron recorded their 5<sup>th</sup> wettest spring on record.

Also, the unusually cool and wet May added more snow cover to the mountains which already had well above normal snowpack. This will result in unusually high snow melt which in turn will cause flooding along some rivers and streams.

## Drought Status:

The above normal precipitation that occurred in April and May brought an end to drought conditions across the area. The maps to the right show where conditions went

from abnormally dry (D0) to moderate drought conditions (D1) across much of the Nebraska panhandle at the beginning of March to elimination of drought conditions by the end of May.

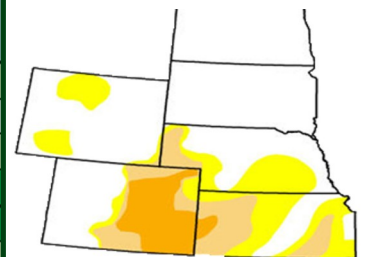
## Intensity:

D0 Abnormally Dry  
D1 Drought - Moderate  
D2 Drought - Severe

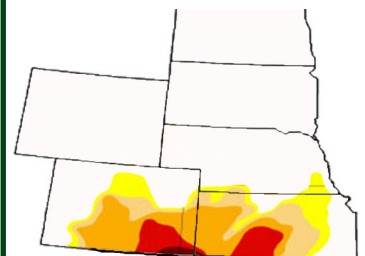
D3 Drought - Extreme  
D4 Drought - Exceptional

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March 1st Drought Status



May 31st Drought Status

## Climate Outlook continued from Page 3

By Rich Emanuel

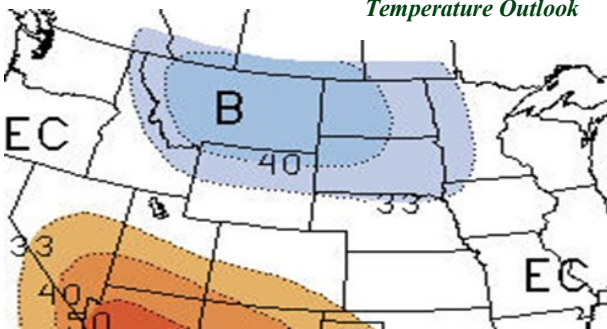
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### July through September Outlook:

The Climate Prediction Center's three month temperature outlook for this area indicates that there are equal chances that temperatures will be above average, near average, or below average temperatures for the period, while there is a slight favoring for below average temperatures across northern Wyoming, as depicted by the figure below. The local downscaled temperature outlook, which provides

Location	Probability Above Normal	Probability Near Normal	Probability Below Normal
Cheyenne	32%	34%	34%
Laramie	33%	34%	33%
Rawlins	34%	33%	33%
Scottsbluff	33%	34%	33%
Sidney	34%	34%	32%
Chadron	33%	34%	33%

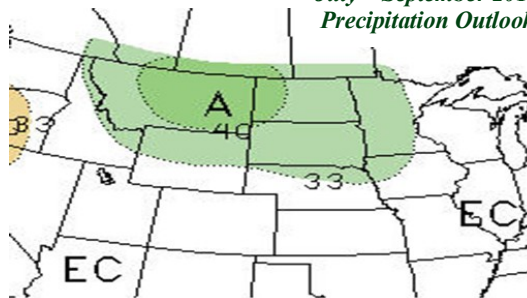
July – September 2011 Temperature Outlook



the temperature outlook for more specific sites as opposed to a general area, shows a slightly greater likelihood for near normal temperatures across southeastern Wyoming and the Nebraska panhandle. Specific probabilities for selected locations in this area are shown in the table above.

For precipitation, the latest outlook indicates that there is about a 35 to 40 percent chance that rainfall during the period will turn out above average across northern Wyoming. Equal chances for above, near, or below average precipitation is forecast for the Nebraska panhandle and southern Wyoming, as depicted below.

July – September 2011 Precipitation Outlook



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### Calendar of Events:

Wed. 9/14/2011—National Weather Service Office Open House

Wed. 10/05/11—Wyoming Winter Weather Awareness Day

Thur. 11/03/11—Nebraska Winter Weather Awareness Day

### Just for Fun Answers:

Tornadoes have occurred in all 50 states.

**True**—Including Hawaii and Alaska

Two percent of tornadoes cause 70% of tornado related deaths.

**True**—The small percentage of violent tornadoes account for the most deaths.

Open windows to prevent damage caused by the pressure change in storms with tornadoes.

**False**—Damage is caused by wind and flying debris. Seek shelter!

If driving when a tornado occurs, get under a overpass.

**False**—Wind is concentrated under overpasses and increases the possibility of injury or death.

Storms with tornadoes produce more lightning and hail than storms without tornadoes.

**True**—The intense updrafts amplify the electrical build up to cause lightning and increase lift which freezes water drops which cause hail.